ASOS MODIFICATION NOTE 38 (for Electronics Technicians)
Engineering Division
W/OSO321:BGM/AJW

SUBJECT	:	ACU Memory Firmware Version 2.6 DCP Boot EPROMs Version 1.80
PURPOSE	:	Firmware Upgrade for ASOS Operational Load.
EQUIPMENT AFFECTED	:	ASOS Acquisition Control Unit (AACU) ASOS Data Collection Package (ADCP)
PARTS REQUIRED	:	ACU Memory Microcircuit P/N 62828-45002-1 ACU Memory Microcircuit P/N 62828-45003-1 ACU Memory Microcircuit P/N 62828-45004-1 ACU Memory Microcircuit P/N 62828-45005-1 DCP Microcircuit P/N 62828-45018-1 DCP Microcircuit P/N 62828-45019-1
MOD PROCUREMENT	:	The above parts are available through NLSC and are required for all ASOS sites. ASOS electronics technicians (ET) will need to order ACU EPROMs S100-1A2A3-U8C for each ASOS. And for sites that have not installed Modification Note #38 (ACU Firmware Upgrade Installation), ET's will need to order S100-2A1A2A1U29 for each Data Collection Package (DCP)
SPECIAL TOOLS REQUIRED	:	IC insertion tool (ASN: 041-T-13) IC extraction tool (ASN: 041-T-16) Conductive foam Electrostatic discharge (ESD) straps
TIME REQUIRED	:	2 hours
EFFECT ON OTHER INSTRUCTIONS	:	EHB - 11, Section 3.6, this modification note supersedes Modification Note 33, Modification Note 20, including errata, Modification Note 31 and Modification 14.
AUTHORIZATION	:	This modification is authorized by ECP E96-SM05F199.
VERIFICATION STATEMENT	:	This modification has been tested for operational integrity at the sites listed in Appendix B and the OSO test facility in, Sterling, VA.

GENERAL

This modification note provides procedures to upgrade the ASOS software by removing and replacing erasable programmable read only memory (EPROM) on the ACU memory board and each DCP CPU. This change adds the temperature probe monitoring for the pressure sensors in Single Cabinet Assemblies (SCA), next generation runway visibility range (NGRVR) processing, thunderstorm sensor processing and warm starts in systems configured with ACE. This note provides procedures for "Before Installing Firmware" and "After Installing Firmware."

PROCEDURE

The following installation instructions are for EPROMs U8, U7, U17, and U21, on the ACU memory board 1A2A3. Installation instructions are included for EPROMs U29 and U30 on the DCP memory board(s) 2A1A2A1 (and 2A1A2A2 if installed). Additionally instructions for installing the RS-422 connector on the ACU I/O (1A9J42) connector panel and the RS-422 adapter cable (1A9W1) are included.

CAUTION:
Be careful to protect the electronics on the ACU memory DCP CPU boards during this procedure. Do not reconfigure any jumpers on the ACU memory or DCP CPU boards unless instructed.

BEFORE INSTALLING FIRMWARE

1. Call the AOMC at 1-800-242-8194 and provide notification on which ASOS you will be installing new ACU and DCP firmware. Confirm that the AOMC will provide access to the site-specific data base. Coordinate with the AOMC that the data base is available. Upload the current configuration before installing the new firmware.

2. Get approval of the responsible MIC/OIC before starting installation. You may install on any day of the month if restrictions in steps 3 and 4 are satisfied.

3. **Commissioned Sites Only**: Do not start installation during bad weather, precipitation, instrument flight rule (IFR) conditions, or if any of these conditions are expected within 3 hours. The responsible MIC/OIC will define these meteorological conditions.

4. Do not start firmware installation at a time that will conflict with scheduled synoptic observations at 00, 03, 06, 09, 12, 15, 18, and 21Z. Although one (1) hour should be sufficient, allow 2 hours to complete installation and restart ASOS.

5. Immediately before beginning work at NWS staffed sites, the MIC/OIC will inform the tower and any other critical users that ASOS will be shut off for a firmware upgrade. At an unstaffed site, the el tech will inform the tower using Controller Video Displays (CVD) and Operator Interface Devices (OID) to log off and shut down display power to avoid confusion.

NOTE:

Commissioned sites only are to download the following data to the laptop using the direct command mode: 5-minute data (12 hrs.), SYSLOG information (24 hrs.), SHEF messages (24 hrs.), and any 2-hour archive files. Forward collected data to the responsible DAPM.

6. Do not begin the installation process (i.e., halt ASOS) until immediately after an hourly observation has been transmitted. At NWS-staffed sites, normal backup observing procedures will be implemented.

7. Go into the AOMC page (REVUE-SITE-VERSN-AOMC); wait for the external communication and the site physical lines to change from "UPLOAD REQ" to "COMPLETE" before going to the next step. Disable all hardware and dial communication ports to AFOS (REVUE-SITE-CONFG-COMMS). The system voice function will automatically broadcast a "not available" message when the ACU power is turned off.

8. Make the appropriate SYSLOG entries (MAINT-ACT-FMK) Mod 38
   a. Log on as **TECH**;
   b. Key the **MAINT** screen;
   c. Key the **ACT** page;
   d. Key **START** - Stop here and preform Mod 38. As described in Appendix "A"; and upon completion of the Mod 38, log onto the system.

AFTER INSTALLING FIRMWARE

See below, in Step 11, for a description of the time required to reboot ASOS and sensor response time after a new firmware load.

9. When ASOS is restarted at unstaffed sites, call to inform towers using CVDs and OIDs to turn on their displays. (At staffed sites, the MIC/OIC will call the tower.)

10. If on-site NWS staff provides backup while the installation is underway, no special observation is needed when ASOS is restarted. Proceed to step 11.

    If there is no backup at a site and a record observation was missed during the installation, a special observation must be taken when ASOS is restarted. The el tech should take the following steps at the ASOS keyboard after installation:
    a. Press [SIGN];
    b. Type his/her initials and press [RETURN];
    c. Type the observer level password and press [RETURN];
    d. Press [GENOB];
    e. Press [SPECL];
    f. Press [EXIT];
    g. Press [SIGN];
    h. Type his/her initials again and press [RETURN];
    I. Press [RETURN] twice. This signs the "observer" off ASOS; and
    j. Leave ASOS running.

Note:
The observer must sign off before the 5-minute edit time is up.

11. Inform the office staff that ASOS is again operational. If less than 25 minutes remain until the next hourly observation, augmentation of the ceiling may be required. Augmenting several elements may be necessary (or even the entire observation). The chart below indicates how long it takes after a startup for ASOS to report each observation element automatically.

Times Needed for Elements to be Reported Automatically

	Minimum	Maximum
Pressure	60 seconds	10 minutes
Precipitation Amount	60 seconds	*
Wind direction	2 minutes	7 minutes
Wind speed	2 minutes	7 minutes
Precipitation Type	2 minutes*	
Temperature	5 minutes	10 minutes
Dew Point	5 minutes	10 minutes
Visibility	10 minutes	15 minutes
Obstruction to Visibility	10 minutes	*
Ceiling	30 minutes	35 minutes

* Maximum time not applicable since phenomena may not be present. Minimum time applies if phenomena are present.

12. Verify that ASOS transmitted an hourly observation. Call the AOMC at 1-800-242-8194 and tell the operator:
    a. Your location;
    b. That installation of the new firmware has been completed; and
    c. That ASOS is operational.

13. Enter in the SYSLOG that maintenance has been completed.
    a. Key the **MAINT** screen.
    b. Key the **ACT** page.
    c. Key **FMK** - Enter the Field Mod Kit (FMK) number as follows: **Mod 38**. On the second line of the screen verify that only Mod 38 is displayed. Complete by entering **Y** in the Y/N area if only Mod 38 is displayed. If other modifications are completed, make appropriate log entry.
    d. Check the SYSLOG and verify the FMK message. Enter a comment in the SYSLOG stating that version 2.49 for the ACU and version 1.80 for the DCP has been installed.
    e. Notify the AOMC via telephone that Mod 38, Firmware v2.49 / v1.80 has been completed.

14. At an expansion site with ATCT, the ET will contact the ATCT and supply information on the following:
    a. ASOS maintenance has been completed.
    b. ASOS has been restored to service.
    c. Tower CVDs, OIDs, and TRACON displays need to be turned on.

15. Return Removed Parts. Parts removed (EPROMs) should be properly packed and returned to NRC and marked as S100-FMK015.OLD.

Reporting Modification

Target date for completion of this modification is outlined in appendix D. Report completed modification on a Weather Service Form A-26 maintenance record. Follow instructions in EHB-4, Part 2, Appendix F, using reporting code AACU. Add in the comment field that version 2.49, version 1.80, J45 connector and the RS-422 adapter cables were installed. Please ensure that the serial number recorded in Block 8 reflects the most up to date information.

Also, record the modification number in block 17 (A) as 38 (see Appendix C for a completed sample of WS Form A-26).

John McNulty
Chief, Engineering Division

Appendix A
Appendix B
Appendix C
Appendix D

INSTRUCTIONS

FIELD MODIFICATION KIT - ASOS SOFTWARE VERSION UPGRADE

GENERAL

All ASOS application software is contained on the four erasable programmable read only memory (EPROM) integrated circuits (IC) on ACU memory board 1A2A3 or SCA 7A1A1A2A3 memory board. Figure 1 illustrates the ACU memory board and identifies the four EPROMs (U8, U17, U7, and U21) to be replaced. Figure 2 illustrates the DCP memory board 2A1A2A1 and/or 2A1A2A2 and identifies the two EPROMs (U29 and U30) to be replaced. The EPROMs are 32-pin dual in-line package (DIP) CMOS devices, each providing 512K x 8 bits of storage. Upgrading ASOS software requires only replacing the four EPROMs on the ACU memory board with higher revision level ICs.

The four EPROMs on the ACU memory board or SCA Memory board contain both the ACU application program and the DCP application program. The CPU runs the application program directly from the ACU memory board or the SCA memory board. The DCP application program must first be downloaded from the ACU memory board or SCA memory board to RAM storage in the DCP before it can be run by the DCP CPU.

Sites without a local OID (i.e., no RS232 connected for the primary OID) should attach a terminal to the primary OID port of the ACU 1A9J22 or the SCA 1A9J19 before proceeding.

SOFTWARE UPGRADE PROCEDURE

This procedure provides instructions to upgrade ASOS software by removing and replacing the EPROMs. The procedure starts with the DCP and then advances to the ACU. After new EPROMs are installed, this procedure cold starts both the ACU (or SCA) and associated DCPs.

If the ACU EPROMs in the system are 1.70 or higher, the ACU is no longer cold started by removing battery jumper J22 (Figure 1) to clear all RAM on the board. The next step requires receiving a download of site-specific data from the AOMC. The DCPs are cold started by performing a hard reset of each DCP from the processor status page on the OID. After completion of the upgrade procedure, the EPROMs removed from the ACU and DCP boards should be packaged in appropriate electrostatic discharge (ESD) protective material for return to NRC.

Note

There may be an approximate 20-minute wait required to access the AOMC.

DCP EPROM Installation:

Step

1. If there is more than one DCP at the site, each DCP must receive this modification.

CAUTION:

Damage to equipment may result if power is not removed prior to removal or installation. Ensure that OUTPUT POWER switch is set to 0 (OFF) and facility power is removed.

To avoid damage to circuit boards and integrated circuits, use proper ESD handling procedures, including using a grounding strap when performing the following steps.

2. Set OUTPUT POWER switch on UPS status panel to the 0 (**OFF**) position. The indicator for the OUTPUT status panel extinguishes. (This step is only required on systems with a UPS).

3. Remove facility AC power from DCP cabinet by turning off the circuit breakers in the AC Junction Box or turning off the Facility Disconnect Box.

4. Remove the radio cable(s) from the JK1 connector on the front of the CPU board located in 2A1A2A1 (and 2A1A2A2 if installed).

5. Using a small flat blade screwdriver, loosen captive screws located at top and bottom of the DCP CPU board(s) 2A1A2A1 (and 2A1A2A2 if installed).

6. Press extractor handles at top and bottom of DCP CPU boards 2A1A2A1 (2A1A2A2 if required) in opposite directions to release board. Remove board from rack.

CAUTION:

Throughout this procedure, discharge the screwdriver before and during use by touching tool to the grounded chassis surface. Failure to comply may result in damage to the integrated circuits.

NOTE:

A supply of IC extraction and insertion tools has been placed in stock for the ETs to purchase. They are located in the miscellaneous tools and supplies section of EHB-1.

7. Using an integrated circuit IC extractor, remove U29 and U30 from the DCP CPU printed circuit boards 2A1A2A1 (and 2A1A2A2 if installed). Place the removed integrated circuits in a conductive foam or on some other static-free surface.

8. Remove the new EPROM ICs from the protective package and insert them into the DCP CPU board sockets in accordance with the following chart. Ensure that the EPROMs are installed with pin 1 (as identified by notch in top of IC) oriented toward board connector P1 and P2 as shown on Figure 1.

IC socket	IC part number
U29	62828-45018-1 Version 1.80
U30	62828-45019-1 Version 1.80

9. Hold the DCP CPU board by the handles, position the board with the component side facing to the right and carefully slide the board into the card rack on its guides. Align the board with the rear connector and press into place.

10. Use a small flat blade screwdriver, and tighten the captive screws located at the top and bottom of the DCP CPU board.

11. Connect the radio cables removed in step 4 to the CPU cards at JK1. Observe marking on cables to ensure proper connection.

12. Apply facility AC power from DCP cabinet.

13. Set OUTPUT POWER switch on UPS status panel to the 1 (**ON**) position. The indicator for the OUTPUT status panel lites. (This step is only required on systems with a UPS).

14. If there is more than one (1) DCP at the site, each DCP must receive this modification.

15. Proceed with the ACU EPROM installation.

ACU EPROM Installation:

1. If the printer is on-line, place it off-line by pressing the **ON-LINE** switch located on the printer front panel.

CAUTION:

Damage to equipment may result if power is not removed prior to removal or installation. Ensure that OUTPUT POWER switch is set to 0 (OFF) and facility power is removed.

To avoid damage to circuit boards and integrated circuits, use proper ESD handling procedures, including using a grounding strap when performing the following steps.

2. Set the OUTPUT POWER switch on UPS status panel to the 0 (**OFF**) position. The indicator for the OUTPUT status panel extinguishes. (This step is only required on systems with a UPS).

3. Remove facility AC power from ACU or SCA cabinet.

4. Using a small flat blade screwdriver, loosen the captive screws located at top and bottom of blank panel located in the ACU at 1A2A4 or in the SCA at 7A1A1A2A4. This panel must be removed before removing memory board in slot 1A2A3 or 7A1A1A2A3 to avoid damage to IC. on the memory card.

5. Using small flat-tipped screwdriver, loosen captive screws located at top and bottom of ACU memory board 1A2A3 or SCA memory board 7A1A1A2A3.

6. Press extractor handles at top and bottom of memory board 1A2A3 or 7A1A1A2A3 in opposite directions to release board. Remove board from rack.

7. On the underside of the memory board, using a flat blade screwdriver, remove three screws and flat washers securing front panel to board. Remove board from front panel.

CAUTION:

Throughout this procedure, discharge the screwdriver before and during use by touching tool to the grounded chassis surface. Failure to comply may result in damage to the integrated circuits.

Lift integrated circuit as evenly as possible. Failure to comply may result in damage to integrated circuits.

8. Use an IC extraction tool to remove U7 from the front of the board slide. Carefully lift up on U7 to remove it from the socket as evenly as possible. After U7 is removed from the socket, place in a conductive foam or on some other static-free surface. See note page A2 for instructions on obtaining IC extraction/insertion tools.

9. Repeat Step 8 for removal of the following integrated circuits U8, U17 and U21.

CAUTION:

The ACU memory board has a battery that keeps voltage on the RAM sockets. DO NOT use a metal insertion tool when installing the RAM ICs. Avoid shorting out the voltage and ground pins. Shorting out the voltage pin will corrupt any stored data and is similar to performing a cold boot.

10. Remove the new EPROM ICs from the protective package and insert them into the memory board sockets in accordance with the following chart. Ensure that the EPROMs are installed with pin 1 (as identified by notch in top of IC) oriented toward board connector P1 and P2 as shown on Figure 1.

IC socket	IC part number
U8	62828-45002-1
U17	62828-45003-1
U7	62828-45004-1
U21	62828-45005-1

11. Use a small flat blade screwdriver, and install the three flat washers and screws. This will secure the front panel to the board.

12. Hold the ACU memory board by handles, position the board with the component side facing to the right and carefully slide board into VME slot 1A2A3 or SCA slot 7A1A1A2A3. Align the board with the rear connector and press into place. Reinstall the ACU 1A2A4 board or SCA 7A1A1A2A4 blank panel.

13. Use a small flat blade screwdriver and tighten the captive screws located at top and bottom of boards and blank panels.

14. Sites identified in appendix D requiring NGRVR must complete this step. Verify that J42 has been installed on the ACU I/O panel. If J42 is not installed, remove the J42 connector cover and save the hardware. Install connector S100-1A9J22 using the removed hardware. For ACUs with serial numbers less than 289 must install RS-422 cable adapter, S100-1A9W1 on the inside of the J42 connector. This cable corrects a wiring error in the SIO cable harness. Connect P18 of the cable harness to J42 or the cable adapter as appropriate.

15. Apply facility power to ACU cabinet. Set OUTPUT POWER switch to 1 **(ON**) position. (This step is not required for systems that do not have a UPS).

16. After the power is applied to the ACU, one of the PASS (Green) LEDs on the CPU should illuminate and the PASS LED on the other CPU will remain off. After approximately
1 minute, the LED that was off should start blinking.

17. Place the line printer on-line by pressing the **ON-LINE** switch located on the printer front panel. The **ON-LINE** indicator illuminates.

18. With the power applied to the ACU and OID and after a brief warmup delay, the OID displays 1-minute data. If the display is not being updated, press the HELP key twice to refresh screen. The NEED SID AND AOMC PHONE message appears at top of screen. If this does not occur, return to REMOVAL procedure, step 1. Follow the steps until the ACU memory board is removed. Ensure the ACU EPROMs are installed correctly. Follow the INSTALLATION procedures to replace the ACU memory board.

19. At the OID, sign onto system as a Technician. Note: Passwords are reset to the default values.

20. Display the external communications page on the OID (sequentially press REVUE-SITE-CONFG-EXTRN keys from the 1-minute display). Enter both AOMC phone numbers (1-800-253-4717 & 1-800-434-1133) into the AOMC PHONE NUMBER field and press the EXIT function key.

21. Display the site physical page on the OID (sequentially press REVUE-SITE-PHYS function keys from 1-minute display). Enter the three or four character SID code in the STATION IDENTIFIER field and press the EXIT function key. The system then calls the AOMC and receives a download of site-specific data.

22. Display the AOMC version page on the OID (sequentially press REVUE-SITE-VERSN-AOMC function keys from 1-minute display). This will allow you to observe that all the files are being downloaded from the AOMC. All status fields should read "COMPLETE" in approximately 5 minutes. Press EXIT.

    NOTE: The following steps cold start the DCPs.

23. Display the maintenance page on the OID (press the MAINT function key from 1-minute display).

24. Use the PREV/NEXT keys, position the cursor over PROC field and press the SEL key. The OID displays the processor status page.

25. Use the PREV/NEXT keys, position the cursor over DCP #1 - HARD field and press the RESET key. Respond "YES" and "ENTER" to the "ARE YOU SURE?" message. The corresponding status field displays INITIALIZING while the unit is initializing. The progress of the download can be monitored by the PERCENT COMPLETE message that appears at the top of the screen. When the percent complete reaches 100, the DCP status field changes to RUNNING in a single DCP configuration.

26. If the system contains more than one DCP, repeat step 25 for DCPs #2 and #3 as required. Once all the DCPs have been completed, the DCP status field will change to RUNNING. If the DCP status does not change to running or sensor data is not being returned from the DCP, it will be necessary to pull the battery jumper on each DCP memory board.

27. Configure the NGRVR on SIO board 1 (RS-422) port 3 for those sites identified in appendix D. From the 1 minute page, key REVIEW-SITE-CONFIG-COMMS and configure SIO board 1 port 3 as RVR. Set the following parameters: ENABLE, 2400, EVEN, 7, 1, NONE, HARDWIRE.

28. After the modification has been completed, clear any maintenance flags that occur as a result of the restart.

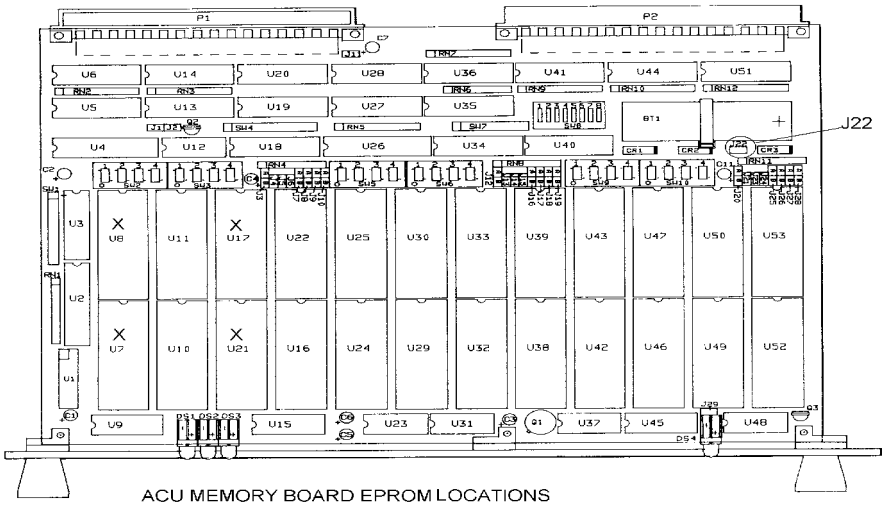
29. Display the software version page on the OID (sequentially press REVUE-SITE-VERSN-SW function keys from 1-minute display). The following fields should display version 2.49: MEMORY ACU APPLICATION EPROM, MEMORY DCP APPLICATION EPROM,

and MEMORY DCP APPLICATION RAM. The PSOS field should display 1.80 for the DCP. These fields may take 5-10 minutes before the display is updated.

30. Upload site configuration to the AOMC. Go into the AOMC page (REVUE-SITE-VERSN-AOMC) wait for all the lines to change from “UPLOAD REQ” to “COMPLETE.”

31. Verify that the system time and date are correct. Two or three hours after installation, dial into the system and verify that the system date and time are correct.

ASSEMBLY DRAWING



ACU MEMORY BOARD EPROM LOCATIONS

FIGURE 1

EPROM
U7
U8
U17
U21

ASSEMBLY DRAWING

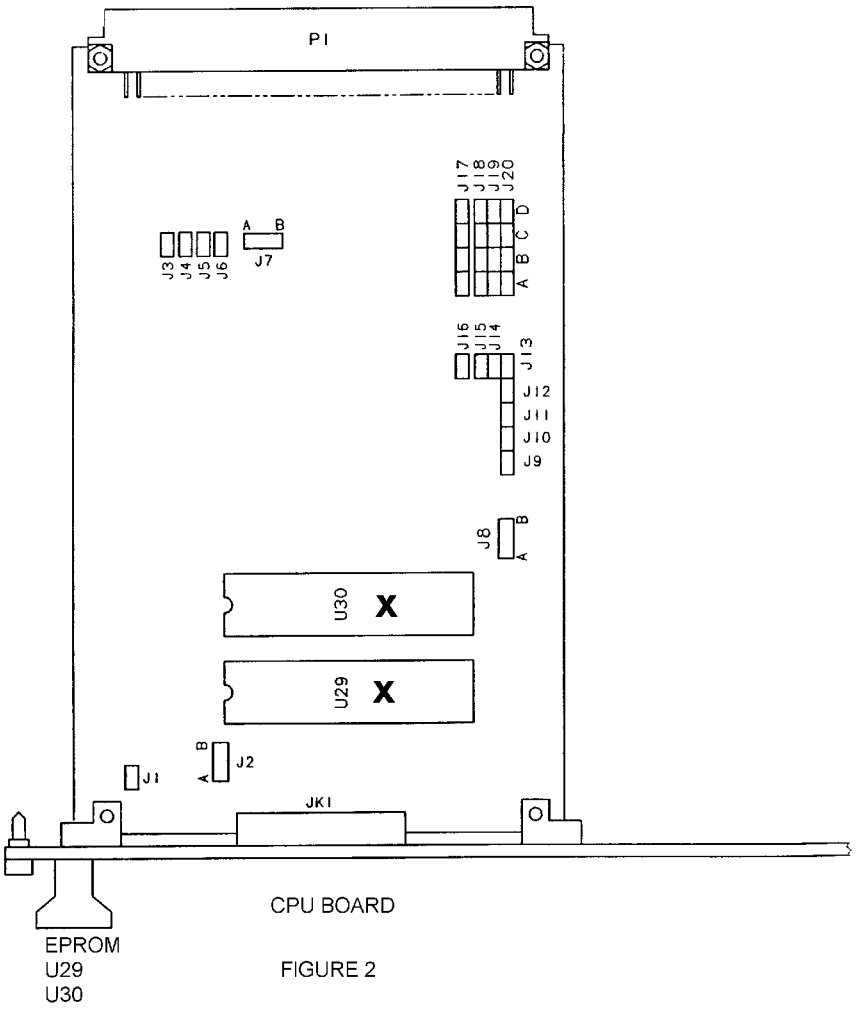


FIGURE 2

The Test Sites for Firmware version 2.49 are:

SID	CITY	STATE	AIRPORT
BFF	Scottsbluff	NE	Heilig Field
CNK	Concordia	KS	Blosser Municipal Airport
DCA	Washington, DC	DC	Washington National Airport
HON	Huron	SD	Huron Regional Airport
MIA	Miami	FL	Maimi Internation Airport
MCI	Kansas City	MO	Kansas City International Airport
OFK	Norfolk	NE	Stefan Memorial Airport
OKC	Oklahoma City	OK	Will Rogers World Airport
PWA	Oklahoma City	OK	Wiley Post Airport
SPS	Wichita Falls	TX	Sheppard Air Force Base
TUP	Tupelo	MS	Tupelo Municipal - Lemons Airport
VCT	Victoria	TX	Victoria Regional Airport

Sample of A-26

ASOS ACU Version 2.49 Sites

SID	CITY / STATE	REQUIREMENT	ORDER S100-1A9W1	ORDER S100-1A9J22	INSTALLATION DATE
ALB	Albany, NY	EDITA	N/A	N/A	September 1997
ALS	Alamosa, CO	TSTM	N/A	N/A	September 1997
APN	Alpena, MI	TSTM	N/A	N/A	September 1997
AST	Astoria, OR	TSTM	N/A	N/A	September 1997
ATL	Hartsfield Atlanta, GA	NGRVR	**REQUIRED**	**REQUIRED**	August 15, 1997
BDL	Hartford, CT	EDITA	N/A	N/A	September 1997
BFF	Scottsbluff, NE	TSTM	N/A	N/A	Completed
BIL	Billings, MT	EDITB	N/A	N/A	September 1997
BKW	Beckley, WV	TSTM	N/A	N/A	September 1997
BNA	Nashville, TN	NGRVR	N/A	**REQUIRED**	August 15, 1997
BOS	Boston, Ma	EDITA	N/A	N/A	September 1997
BTR	Baton Rouge, La	EDITB	N/A	N/A	September 1997
BWI	Baltimore, MD	EDITA	N/A	N/A	September 1997
CAK	Akron, OH	EDITA	N/A	N/A	September 1997
CAR	Caribou, ME	TSTM	N/A	N/A	September 1997

CHA	Chattanooga, TN	EDITB	N/A	N/A	September 1997
CLE	Cleveland-Hopkins, OH	NGRVR	N/A	**REQUIRED**	August 15, 1997
CLT	Charlotte, NC	EDITA	N/A	N/A	September 1997
CMH	Columbus, OH	EDITA	N/A	N/A	September 1997
CNK	Concordia, KS	TSTM	N/A	N/A	Completed
CON	Concord, NH	TSTM	N/A	N/A	September 1997
COS	Colorado Springs, CO	EDITB	N/A	N/A	September 1997
CRW	Yeager, Charleston, WV	NGRVR	N/A	**REQUIRED**	August 15, 1997
CVG	Cincinnati, OH	EDITA	N/A	N/A	September 1997
DAB	Daytona Beach, FL	EDITB	N/A	N/A	September 1997
DAY	Cox Dayton, OH	NGRVR	N/A	**REQUIRED**	August 15, 1997
DEN	New Denver, CO	NGRVR	N/A	N/A	August 15, 1997
DFW	Dallas/Ft. Worth, TX	NGRVR/ACE	N/A	**REQUIRED**	August 15, 1997
DSM	Des Moines, IA	EDITA	N/A	N/A	September 1997
DTW	Detroit Metro, MI	NGRVR	**REQUIRED**	N/A	August 15, 1997
EKN	Elkins, WV	TSTM	N/A	N/A	September 1997
ELP	El Paso, TX	EDITB	N/A	N/A	September 1997
ELY	Ely, NV	TSTM	N/A	N/A	September 1997
EWR	Newark, NJ	EDITA	N/A	N/A	September 1997
FAI	Fairbanks, AK	EDITA	N/A	N/A	September 1997

FAT	Fresno, CA	EDITA	N/A	N/A	September 1997
FCA	Kalispell, MT	TSTM	N/A	N/A	September 1997
FNT	Flint, MI	EDITB	N/A	N/A	September 1997
FWA	Fort Wayne, IN	EDITB	N/A	N/A	September 1997
GEG	Spokane, WA	EDITA	N/A	N/A	September 1997
GSO	Greensboro, NC	EDITA	N/A	N/A	September 1997
HNL	Honolulu, HI	EDITB	N/A	N/A	September 1997
HOM	Homer, AK	TSTM	N/A	N/A	September 1997
HON	Huron, SD	TSTM	N/A	N/A	Completed
HSV	Huntsville, AL	EDITB	N/A	N/A	September 1997
HTL	Houghton Lake, MI	TSTM	N/A	N/A	September 1997
HVR	Havre, MT	TSTM	N/A	N/A	September 1997
IND	Indianapolis, IN	NGRVR	N/A	N/A	August 15, 1997
INL	International Falls, MN	TSTM	N/A	N/A	September 1997
ISN	Williston, ND	TSTM	N/A	N/A	September 1997
JAX	Jacksonville, FL	NGRVR	**REQUIRED**	**REQUIRED**	August 15, 1997
LAN	Lansing, MI	EDITA	N/A	N/A	September 1997
LAS	Las Vegas, NV	EDITA	N/A	N/A	September 1997
LAX	Los Angeles, CA	NGRVR	N/A	N/A	*July 15,1997
LBB	Lubbock, TX	EDITB	N/A	N/A	September 1997

LND	Lander, WY	TSTM	N/A	N/A	September 1997
LNK	Lincoln, NE	EDITB	N/A	N/A	September 1997
MCI	Kansas City, MO	NGRVR	**REQUIRED**	N/A	August 1, 1997
MEM	Memphis, TN	NGRVR	N/A	N/A	Completed
MGM	Montgomery, AL	EDITB	N/A	N/A	September 1997
MKE	Gen. Mitchell Milwaukee, WI	NGRVR	**REQUIRED**	N/A	August 15, 1997
MKG	Muskegon, MI	EDITB	N/A	N/A	September 1997
MLI	Moline, IL	EDITB	N/A	N/A	September 1997
MSN	Madison, WI	EDITB	N/A	N/A	September 1997
MSP	Minneapolis-St. Paul, MN	NGRVR	N/A	N/A	August 15, 1997
OFK	Norfolk, NE	TSTM	N/A	N/A	Completed
OKC	Oklahoma City, OK	ACE	N/A	N/A	Completed
ORD	Chicago O'Hare, IL	NGRVR	N/A	N/A	August 15, 1997
ORF	Norfolk, VA	EDITB	N/A	N/A	September 1997
PBI	West Palm Beach, FL	EDITB	N/A	N/A	September 1997
PDX	Portland, OR	NGRVR	N/A	**REQUIRED**	*July 15, 1997
PHX	Phoenix, AZ	EDITA	N/A	N/A	September 1997
PIA	Peoria, IL	EDITB	N/A	N/A	September 1997
PVD	Providence, RI	EDITA	N/A	N/A	September 1997
PWA	Wiley Post, OK	ACE	N/A	N/A	Completed

RDU	Raleigh, NC	EDITA	N/A	N/A	September 1997
RFD	Rockford, IL	EDITA	N/A	N/A	September 1997
RIC	Richmond, VA	EDITA	N/A	N/A	September 1997
ROC	Rochester, NY	EDITA	N/A	N/A	September 1997
SAN	San Diego, CA	EDITA	N/A	N/A	September 1997
SAT	San Antonio, TX	EDITA	N/A	N/A	September 1997
SAV	Savannah, GA	EDITB	N/A	N/A	September 1997
SBN	South Bend, IN	EDITB	N/A	N/A	September 1997
SDF	Standiford, Louisville, Ky	NGRVR	N/A	**REQUIRED**	August 15, 1997
SEA	Seattle-Tacoma, WA	NGRVR	N/A	**REQUIRED**	* July 15, 1997
SFO	San Francisco, CA	NGRVR	N/A	N/A	* July 15, 1997
SHR	Sheridan, WY	TSTM	N/A	N/A	September 1997
SPS	Wichita Falls, TX	TSTM	N/A	N/A	Completed
SSM	Sault Ste. Marie, MI	TSTM	N/A	N/A	September 1997
STC	St. Cloud, MN	TSTM	N/A	N/A	September 1997
STL	Lambert-St. Louis, MO	NGRVR	N/A	N/A	August 15, 1997
SYR	Syracuse, NY	EDITA	N/A	N/A	September 1997
TLH	Tallahassee, FL	EDITA	N/A	N/A	September 1997
TUL	Tulsa, OK	EDITA	N/A	N/A	September 1997
TUP	Tupelo, MS	TSTM	N/A	N/A	Completed

TUS	Tucson, AZ	EDITB	N/A	N/A	September 1997
TYS	Knoxville, TN	EDITB	N/A	N/A	September 1997
VCT	Victoria, TX	TSTM	N/A	N/A	Completed
VTN	Valentine, NE	TSTM	N/A	N/A	September 1997
WMC	Winnemucca, NV	TSTM	N/A	N/A	September 1997
YNG	Youngstown, OH	EDITB	N/A	N/A	September 1997
ICT	Wichita, KS	EDITA	N/A	N/A	March 1998
GTF	Great Falls, MT	EDITA	N/A	N/A	March 1998

TSTM - Thunder Storm Sensor
NGRVR - Next Generation Runway Visibility Range
EDIT(A/B) - RVR edit

* Firmware was shipped directly to the following sites: SFO, LAX, PDX and SEA. Technicians do not need to order firmware for these sites.